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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/782,634	02/18/2004	Christopher J. Freitas	T-6264	5168
34014 7590 05/31/2007 CHEVRON TEXACO CORPORATION P.O. BOX 6006 SAN RAMON, CA 94583-0806			EXAMINER SILVER, DAVID	
			ART UNIT 2128	PAPER NUMBER
			MAIL DATE 05/31/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

Application No.

10/782,634

Applicant(s)

FREITAS ET AL.

Examiner

David Silver

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 06 March 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 8-10 is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>3/29/07</u> . | 6) <input type="checkbox"/> Other: _____  |

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#### **DETAILED ACTION**

1. Claims 1-10 were originally presented for examination.
2. Claims 1-10 were rejected.
3. Claims 1-10 are pending.
4. The Instant Application is not currently in condition for allowance.

#### ***Priority***

5. Priority is not claimed (**Effective Filing: 02/18/2004**).

#### ***Information Disclosure Statement***

6. The information disclosure statement(s) (IDS) submitted on 3/29/2007 is/are in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement(s) is/are being considered if signed and initialed by the examiner. NPL document "Sethian, J. A., 1996 Level set methods: Evolving interfaces in geometry, fluid mechanics, computer vision and materials sciences, Cambridge University Press" has not been considered because only the Contents pages (total **3 pages**) were submitted, and the remaining sections (totaling approximately **217 pages**) have not been submitted for consideration.

#### ***Response to Arguments***

#### ***Response: Specification***

7. **Applicants state:**

"The specification has been amended to correct a misspelling of the word "identifiers" at Page 15, Line 10." (Remarks dated 3/6/2007 ("Remarks"): page 5)

8. **Examiner Response:**

Objection has been **withdrawn**.

#### ***Response: Claim Interpretation***

9. **Applicants state:**

9.1 "Claim 1 has been amended to recite that the number N of materials tracked is at least 2, and

9.2 to recite that "whether voids and overlaps are present is calculated using a product of the unique

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identifiers." (Remarks: page 5)

**10. Examiner Response:**

10.1 Regarding subsection 1 above, the respective interpretation has been **withdrawn** in view of the amendment.

10.2 Regarding subsection 2 above, the limitation presents ambiguities which render the claim indefinite. The respective Claim Interpretation established in the previous Office Action is **maintained**.

***Response: 35 USC §101***

**11. Background:**

Claims 1-10 stand rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The claims do not produce a final result that is concrete, useful and tangible.

**12. Applicants argue:**

12.1 "The relevant question is whether the claimed invention produces a useful, concrete and tangible result, i.e., whether it accomplishes a practical application. See MPEP § 2106; State Street Bank & Trust Co. v. Signature Financial Group Inc., 149 F. 3d 1368, 1373, 47 USPQ2d 1596, 1601-02 (Fed. Cir. 1998). Applicants respectfully submit that the present claims, consistent with the Interim Guidelines for Subject Matter Eligibility set forth in the Official Gazette of November 22, 2005, do produce useful, concrete and tangible results.

12.2 In particular, a simulation of flow of N materials and their interfaces in a computational domain is created according to claim 1, and a determination of whether cells overlap and voids are present in a grid of a fluid dynamics computation is calculated according to claim 8. Accordingly, withdrawal of the rejection under 35 U.S.C. § 101 is respectfully requested." (Remarks: bottom of page 5)

**13. Examiner Response:**

13.1 Applicants attention is drawn to the Latest Revision dated August 2006 of MPEP 2106.IV.C.2.(2) which recites:

"[...] USPTO personnel shall review the claim to determine it produces a useful, tangible, and concrete result. In making

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this determination, the focus is not on whether the steps taken to achieve a particular result are useful, tangible, and concrete, but rather on whether the **final** result achieved by the claimed invention is "useful, tangible, and concrete. In other words, the claim must be examined to see if it includes anything more than a 35 U.S.C. 101 judicial exception. If the claim is directed to a practical application of a 35 U.S.C. 101 judicial exception, USPTO personnel must then determine whether the claim preempts the judicial exception. If USPTO personnel do not find such a practical application, then USPTO personnel have determined that the claim is nonstatutory." (emphasis added)

The MPEP 2106.IV.C.3 further states:

"[A] claim that recites a computer that solely calculates a mathematical formula (see Benson) or a computer disk that solely stores a mathematical formula is not directed to the type of subject matter eligible for patent protection."

In light of the above MPEP recitations, the claims remain drawn to non-statutory subject matter.

The subject matter claims is drawn to a judicial exception (natural phenomenon).

- 13.2 Applicants remarks in subsection 2 *supra* are at best drawn to a conclusionary statement which recites claim limitations and states that a withdraw of the 35 USC §101 rejection is requested.

***Response: 35 USC §112 first / second paragraph***

**14. Background:**

- 14.1 Claims 1-10 stand rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the **enablement requirement**. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Claims 1-7 stand rejected under 35 U.S.C. 112, second paragraph, as being **indefinite** for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

- 14.2 Claims 1-10 stand rejected under 35 U.S.C. 112, second paragraph, as being incomplete for **omitting essential steps**, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps are: establishing a relationship between the unique identifiers with respect to equations of motions.

**15. Applicants argue:**

- 15.1 "Applicants respectfully submit that the amendments to claims 1, 4, 7, 8, and 10 render these rejections under 35 U.S.C. § 112 moot." (Remarks: page 6)

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15.2 "Applicants respectfully submit that there is no relationship between the equations of motion and the unique identifiers. Rather, the equations of motion are solved utilizing the calculated volume fractions to arrive at local velocity conditions, while the unique identifiers are used to calculate whether voids and overlaps are present, as recited in the clause "wherein whether voids and overlaps are present is calculated using a product of the unique identifiers", added to step (g) of claim 1."

(Remarks: page 6)

16. **Examiner Response:**

16.1 Regarding subsection 1 *supra*, Applicants' amendments were sufficient to overcome the 35 USC §112 first paragraph enablement rejections. Therefore, those rejections have been **withdrawn**.

16.2 Regarding subsection 2 *supra*, Applicants' arguments are persuasive. Therefore, the 35 USC §112 second paragraph (**missing essential steps**) rejection has been **withdrawn**.

16.3 However, Applicants' amendments presents new ambiguities which render the claim indefinite. This deficiency is elaborated-upon in the respective 35 USC §112 second paragraph rejection below.

***Response: 35 USC §102***

17. **Background:**

Claims 1, 4, 8 stand rejected under 35 U.S.C. 102(b) as being anticipated by Rudman's "A volume-tracking method for incompressible multifluid flows with large density variations".

18. **Applicants argue:**

"Applicants respectfully submit that none of page 358, paragraph 1; page 359, paragraph 1; and page 360, last paragraph, of Rudman teach calculating whether voids and overlaps are present using a product of the unique identifiers, according to claim 1. More particularly, page 359, equation 2, of Rudman is the second of the four scaled equations of motion disclosed by Rudman, rather than a disclosure of assigning a unique identifier to each of the N materials and to the microgrid cells, according to claim 1." (Remarks: page 9)

19. **Examiner Response:**

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Applicant's arguments are partially traversed.

19.1 With respect to claim 1, the added limitation "wherein whether voids are overlaps are present is calculated using a product of the unique identifiers" is not given patentable weight in view of MPEP 2111.01. In this instance, the limitation **neither further limits the claim nor is recited as a positive step**. Additionally, this limitation suffers from a 35 USC §112 second paragraph deficiencies for lacking antecedent basis. Thus, with respect to thus claim Applicants' arguments are moot.

19.2 Applicant's arguments and amendments with respect to claims 8-10 have been considered and are persuasive. The rejections have been **withdrawn**.

#### ***Claim Interpretation***

20. Merely labeling each of the N materials and the microgrid cells is not given patentable weight until such labeling is used for a specific purpose in order to solve a specific problem (maintained from Previous Office Action).

#### ***Claim Rejections - 35 USC § 101***

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

**MPEP 2106 recites, in part:**

"...USPTO personnel shall review the claim to determine it produces a useful, tangible, and concrete result. In making this determination, the focus is not on whether the steps taken to achieve a particular result are useful, tangible, and concrete, but rather on whether the *final* result achieved by the claimed invention is "useful, tangible, and concrete."

21. Claims 1-10 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

The method steps merely recite a **software algorithm**, *per se*, which, for example, does not display, store, or otherwise provide a useful tangible output. Note exemplary claim 1 which only recites software steps and does not produce a useful tangible and concrete **result**.

#### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

22. Claims 1-7 are rejected under 35 U.S.C. 112, second paragraph, as being **indefinite** for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Regarding all independent claims, the limitation "wherein whether voids and overlaps are present is calculated using a product of the unique identifiers" lacks antecedent basis for the calculation of voids and overlaps. Expanding on this issue, it appears from the limitation that the 'wherein' clause attempts to further limit a step that does not exist. Thus, rendering the claim indefinite.
23. Claims not specifically mentioned are rejected by virtue of their dependency.
24. The Applicants are required to fix all other similar occurrences of the above-cited deficiencies.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

25. Claims 1, 4 are rejected under 35 U.S.C. 102(b) as being anticipated by Rudman's "A volume-tracking method for incompressible multifluid flows with large density variations".

Rudman teaches: 1. A method for creating a simulation of flow of N materials and their interfaces in a computational domain, the method comprising the steps of:

(a) creating a macrogrid including control volumes on a computational domain in which N materials and their interfaces are to be tracked, wherein the number N of materials tracked is at least 2 (**page 360**); (b) overlaying a microgrid including microgrid cells upon the macrogrid with each of the microgrid cells being coupled to a control volume (**page 361 fig 1**); (c) initializing the macrogrid and control volumes with initial and boundary conditions (**page 360 para 1**); (d) assigning a unique identifier to each of the N materials and to the microgrid cells (**page 359 equation 2**); (e) calculating volume fractions for the N-materials in the control volumes (**page 372 last para**); (f) solving equations of motion upon the macrogrid and control volumes utilizing the calculated volume fractions to arrive at local velocity conditions for the control volumes



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(**page 359 para 1**); (g) advecting the microgrid cells within the microgrid based onto the calculated local velocity conditions in the control volumes such that voids and overlaps of the microgrid cells in the microgrid occur, wherein whether voids are overlaps are present is calculated using a product of the unique identifiers (**page 359 para 1; page 360 last para; page 358 para 1**); (h) reallocating the microgrid cells so that only one material is in each microgrid cell to effectively conserve mass and satisfy local fluid fraction gradient values (**page 357 Summary, page 358 last para, page 360 last para**); and (i) repeating steps (e)-(h) until the simulation is complete (**page 374 last para; page 360 para 1**).

Rudman teaches: 4. The method of claim 2 wherein modular arithmetic is used to track the fluid materials which are advected into the microgrid cells of the grid (**This is an inherent limitation in view of Claim Interpretation above.**).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

26. Claims 2-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rudman's "A volume-tracking method for incompressible multifluid flows with large density variations" as applied to claim 1 above, and further in view of Official Notice taken.

MPEP 2106 recites, in part: "**Limitations appearing in the specification but not recited in the claim are not read into the claim.** E-Pass Techs., Inc. v. 3Com Corp., 343 F.3d 1364, 1369, 67 USPQ2d 1947, 1950 (Fed. Cir. 2003) (claims must be interpreted "in view of the specification" **without importing limitations from the specification into the claims** unnecessarily). In re Prater, 415 F.2d 1393, 1404-05, 162 USPQ 541, 550-551 (CCPA 1969). See also In re Zletz, 893 F.2d 319, 321-22, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989)"

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As per claims 2, 3, and 9, the applied prior-art does not expressly disclose that the unique identifier numbers are prime numbers (claims 2 and 9) or numbers generated by Eulerian quadratic number generator (claim 3). At the time of the invention, it would have been an obvious matter of design choice to a person of ordinary skill in the art to use such numbers because Applicant has not disclosed that the particular features provide an advantage, are used for a particular purpose, or solve a stated problem, **as currently claimed**. It may appear the Specification discloses a specific purpose for the labeling of the items associated therewith. However, the purpose and the method of applying the unique labeling are recited in the claims. Therefore, one of ordinary skill in the art, furthermore, would have expected Applicants' invention to perform equally well with such feature because the choice of labeling does not affect the invention in the applied prior art. Specifically, there is not particular advantage of using either a prime numbers, or a Eulerian quadratic number generator for the unique identifier numbers when such numbers are used merely for labeling and do not solve a specific problem.

27. Claims 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rudman's "A volume-tracking method for incompressible multifluid flows with large density variations" as applied to claim 1 above, and further in view of William J. Rider's "Reconstructing Volume Tracking" ("Rider").

As per claim 5, Rudman discloses all limitations of claim 1. Rudman however does not expressly disclose that the number N of materials tracked is at least 3. Rider however discloses an analogous fluid simulation system having the said feature **(page 120 Fig 4 and texts associated therewith)**. It would have been obvious to one of ordinary skill in the art <fluid simulation> at the time of Applicant's invention to combine the references in order to simulate multiple fluids at the same time, rather than doing two fluids at a time, thereby saving time and costs associated therewith. In fact, Rudman gives the motivation on **(page 357 last paragraph: "In the numerical computation of immiscible multifluid problems with large density variation [...], there is need of an accurate representation of the interface separating the fluids...")**.

As per claim 6, Rudman discloses all limitations of claim 1. Rudman however does not expressly disclose that the number N of materials tracked is at least 4. Rider however discloses an analogous fluid

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simulation system having the said feature **(page 120 eq 1b, 2 when k is equal to 4)**. It would have been obvious to one of ordinary skill in the art <fluid simulation> at the time of Applicant's invention to combine the references in order to simulate multiple fluids at the same time, rather than doing two fluids at a time, thereby saving time and costs associated therewith. In fact, Rudman gives the motivation on **(page 357 last paragraph: "In the numerical computation of immiscible multifluid problems with large density variation [...], there is need of an accurate representation of the interface separating the fluids...")**.

As per claim 7, Rudman discloses all limitations of claim 1. Rudman however does not expressly disclose the interfaces between the N materials are tracked by the location of the microgrid cells containing different fluid materials. Rider however discloses an analogous fluid simulation system having the said feature **(page 120 Fig 4 and texts associated therewith)**. It would have been obvious to one of ordinary skill in the art <fluid simulation> at the time of Applicant's invention to combine the references in order to not be limited to the simulation of a single fluid. In fact, Rudman gives the motivation on **(page 357 last paragraph: "In the numerical computation of immiscible multifluid problems with large density variation [...], there is need of an accurate representation of the interface separating the fluids...")**.

#### ***Allowable Subject Matter***

28. Claims 8-10 contain allowable subject matter.

29. The following is an examiner's statement of reasons for allowance:

The art of record, individually or in combination, fails to suggest or render obvious the specific arrangement of the claimed invention as recited in the claims and disclosed in the Specification.

The most relevant prior art of record is Rudman and discloses all limitations of claim, except for: "calculating whether overlapping cells and voids are present in the grid using a product of the unique identifiers of each of the cells located at a particular microgrid location".

#### ***Conclusion***

30. The Instant Application is not currently in condition for allowance.

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Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Silver whose telephone number is (571) 272-8634. The examiner can normally be reached on Monday thru Friday, 10am to 6:30pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamini Shah can be reached on 571-272-2279. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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Art Unit 2128

  
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